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ABSTRACT

The reference tools discussed in these two units of the instructional package (other units are: LI004051 and LI004053 through 004055) are: General Technical Encyclopedias and Engineering Handbooks. The unit concerned with encyclopedias summarizes the basic features of a good encyclopedia and gives some general procedures which are helpful in establishing familiarity with a new encyclopedia. The unit on engineering handbooks looks at two specialized sources of engineering information: (1) "Standard Handbook for Mechanical Engineers," and (2) "Handbook of the Engineering Sciences." The use of both of these reference tools is discussed at length. (ED 032 085 discusses this instructional package.) (Author/NH)

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ED 070497

REFERENCE TOOLS AND SERVICES:

General Technical Encyclopedias

and

Engineering Handbooks

On-The-Job Training of Library Personnel

U.S. Office of Education
OEC-1-7-071214-5116
with support from the U.S. Army ATLIS Project

System Development Corporation
2500 Colorado Ave.
Santa Monica, California 90406

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SDC

General Technical Encyclopedias:

McGraw-Hill Encyclopedia of Science and Technology

Instructions for Using the Text

Part of the following instruction is in the form of a "programmed text"--that is, in working with it, you must follow the instructions as to which pages to turn to, rather than reading it through, page by page. It contains a series of multiple-choice questions. At the end of each question are numbered answers; the number of each answer is also the number of the page on which that answer is discussed. Don't worry about getting the wrong answers. The text will help you get through the entire series of questions, whether your first answers are right or wrong.

GENERAL TECHNICAL ENCYCLOPEDIAS

Encyclopedias are one type of reference works and are intended to be consulted for specific information rather than read through. They are compilations of information organized in such a way as to make it relatively easy to find specific subjects and facts.

A handbook is similar to an encyclopedia in that both provide basic facts and information about subjects. But the handbook is usually complete in one volume and is likely to consist of many tables, charts, definitions and similar highly condensed information, often of a rather specialized subject field. It frequently is arranged by the major topics of the overall subject, with a detailed alphabetical index to assist the user in finding specific information. The encyclopedia, on the other hand, has more extensive information in the form of articles, usually arranged alphabetically, covering a wider range of topics, and issued in several volumes. It usually covers many subjects and therefore cannot provide much minor detail or specialized information on any one particular subject.

The nature of an encyclopedia makes it difficult for the publisher to revise it frequently. A good encyclopedia is likely to have articles written by authorities in the field who may not have the time to

write continually up-dated versions. It takes much time and money to gather, edit, print and publish a large encyclopedia. The time lag from beginning to publishing may be two years or more. Some encyclopedias attempt to solve this problem by issuing annual yearbooks which contain up-dated articles on subjects where there has been either drastic change or sudden interest.

An encyclopedia is a good source in <u>becoming acquainted with a subject</u> and in establishing basic guidelines in relation to other subjects. Through cross references and bibliographies, one is referred to related entries or additional information. It is a convenient way to get a quick overview of a subject and to see what the special relation of a specific subject is to a larger subject. On can pick up such additional clues as special vocabulary or terminology, which will be useful in searching other sources such as indexes to abstracting services.

<u>The basic features</u> of a good encyclopedia can be summarized as follows:

1. Articles give basic information about specific subjects.
2. Arranged alphabetically or by broad categories.
3. Alphabetical subject index.
4. Cross references to lead the user to related topics.
5. Illustrations, schematic drawings, photographs, tables, etc. accompany the text.

6. Bibliographic citations to additional sources of information.
7. Articles signed by contributors.
8. Never quite up-to-date, but annual supplements, where published, help bridge the gap.

There are some general procedures which are helpful in establishing familiarity with a new encyclopedia.

1. Read the instructions or introduction. The publisher uses this means of indicating the scope of the work, the general arrangement, the level of user, the special features, the validity of the information. It is time well spent.
2. Check the method of alphabetical arrangement. There are two basic methods: (a) word by word; (b) letter by letter, disregarding spaces after words. This will affect the location of the specific entry. For example, AIR POLLUTION filed word by word will come before AIRCRAFT, but if the arrangement if letter by letter it will come after AIRCRAFT.
3. Check the system for giving cross references. They may stand as separate entries (AIR POLLUTION see ATMOSPHERIC POLLUTION), or may appear within an article or at the end of an article.
4. Study the organization of major categories of entries. For example, is everything on computers in one article or is it scattered in several more specialized articles?
5. Are entries signed by the initial or full name of contributor? If by initial, is there a list identifying the contributors? Does

the list show not only the name but the affiliation of the contributor? Such a list can be used to identify people who may not be in biographical directories.

6. Browse through the set, volume by volume, looking for special features. Are there bibliographies, reading outlines, statistical tables, color plates, maps, diagrams, line drawings, charts, subjects you did not expect to find in that encyclopedia?

7. Look over the index or indexes, if more than one. If there are special instructions for the index, be sure to read them and test them. Does the index contain special information which might not be found through the regular articles? What is the purpose of the special indexes?

8. If abbreviations are used in the encyclopedia, find where they are written out and defined. This may be in the introduction, the index, or sometimes even in the text under "Abbreviations."

9. Think of a specific subject and try to find it in the encyclopedia, first by going directly to the text, using any cross references encountered. Then use the index to see if you have found all the places in the encyclopedia which cover the subject.

10. Test the up-to-dateness by checking the bibliographies in articles of recent special interest. If the most recent reference is more than five years old, the encyclopedia may not be too up-to-date, unless specific references to more recently dated events are found in specific articles.

McGraw-Hill Encyclopedia of Science and Technology. Revised edition. New York, NcGraw-Hill Book Company, 1966. 15 vols.

For many years there was no comprehensive multi-volume encyclopedia covering science and technology. There were one-volume encyclopedias which were more like dictionaries, and handbooks which contained compact data but often did not give descriptive information useful to the layman or non-specialist. In the 1950s the McGraw-Hill Book Company, publisher of many scientific and technical handbooks and textbooks, decided to attempt the compilation of an up-to-date encyclopedia which would record many of the modern developments in these basic areas, especially those stimulated by modern research and technological developments. The first edition, published in 1960, proved so popular and useful that a second edition was brough out in 1966. Annual yearbooks are published to cover new developments.

Read the information in the Prefaces to the first edition and the revised edition of the McGraw-Hill Encyclopedia of Science and Technology (which we will refer to as MHEST). Turn to the next page.

Question

A high-school senior enters your library and tells you that she is doing a paper on "revolutionary changes in scientific theory, 1950 - 1960." She feels a science encyclopedia might be helpful and has hear favorable comments about MHEST.* What suggestions would you make to her? Select the best answer and turn to the page indicated by the number preceding it.

7. Point out that the material in MHEST is highly technical and therefore unsuitable for her needs.
8. Suggest that she read the forematter in MHEST very carefully.
9. Advise her that biographical, historical and philosophical considerations are not treated in detail in MHEST; suggest an alternative that will better suit her needs.

* Hereafter we shall use this abbreviation for the McGraw-Hill Encyclopedia of Science and Technology.

Your answer is that you would point out that the material in MHEST is highly technical and therefore unsuitable for her needs. Wrong. The articles in MHEST "are within the comprehension of the interested high school student." Re-read the information in the Prefaces and select another answer. The question is on page 6.

Your answer is that you would suggest that the patron read the "forematter" in MHEST very carefully. Wrong. Although this is good general advice to give a reader who is using any reference work; it is not an especially helpful suggestion in this particular case. Re-read the information in the Prefaces, return to the question on page 6, and choose another answer.

Your answer is that you would advise the patron that biographical, historical, and philosophical considerations are not treated in detail in MHEST. You are correct. The Prefaces point out that these questions are included "only as required in the natural and factual development of technical subjects" and "only if needed for the basic understanding of a scientific concept or its technical application." You should suggest an alternative that will better suit the patron's needs.

Turn to the next page.

In Volume I, turn to "Guide for Readers: Basic plan of the encyclopedia." Read the information carefully.

Question

A patron tells you that he needs a more detailed definition of the word "aeronomy" than the abridged dictionary provides. What suggestions can you make to him? Select the best answer and turn to the page with the corresponding number.

12. Consult an unabridged dictionary
13. Consult the glossary in MHEST
14. Look up the word in a base volume (1-14) of MHEST

If you have turned to this page, you are not following instructions.

Return to the question on page 9 and do as you are directed.

Your answer is that you would suggest the patron consult an unabridged dictionary. This is not entirely incorrect. It is true that unabridged dictionaries usually include all scientific and technical words used by English-speaking people. If you had consulted Webster's [Unabridged] International Dictionary (3rd Edition), you would have found a very brief definition. The patron said that he needed a detailed definition. Return to the question on page 10 and select a better answer.

Your answer is that you would consult the glossary in MHEST. You are guessing. There is no glossary in MHEST. Re-read Guide for Readers: Basic plan of the encyclopedia at the beginning of Volume I, return to the question on page 10 and select the correct answer.

Your answer is that you would look up the word in a base volume of MHEST. You are correct. Turn to page 98 of Volume I. Find aeronomy. Note that there is a detailed definition of the word as well as separate articles covering its main subdivisions and more specific aspects; cross-references are included.

Turn to the next page.

Question

The patron says he would like to find out the professional affiliation of C. G. Stergis who wrote the article in MHEST on aeronomy. How would you assist him? Select the best answer and turn to the page indicated by the number preceding it.

16. Suggest he consult American Men of Science
17. Tell him that the list of contributors to MHEST is in Volume 15.
18. Refer him to the Appendix at the end of Volume I of MHEST

Your answer is that you would suggest he consult American Men of Science. This is not incorrect. Each entry in this work contains such basic information as name, position, address, field, birthplace, degrees, positions held, memberships in organizations, and research specialties. If you had looked in American Men of Science, you would have found that C. G. Stergis is listed and that a complete citation appears after his name. However, this is not the only approach to answering the patron's question. The information he requested was really quite limited. Return to the question on page 15 and pick an alternative answer.

Your answer is that you would tell him that the list of contributors to MHEST is in Volume 15. You are correct. A list of encyclopedia contributors with their affiliations and the titles of the articles written for the encyclopedia is in Volume 15. Pick up the volume. Turn first to the Key to Contributors. Browse through it.

Question

What is Stergis' first name? Write it below and then turn to page 19 to be sure you are correct.

Your answer is that you would refer the patron to the Appendix at the end of Volume I of MHEST. Wrong. You are guessing. There is no Appendix to MHEST. Return to the question on page 15 and pick the correct answer.

You are correct if you wrote that Stergis' first name is Christos. Turn to the next page.

The list of contributors begins on page XV of Volume 15. Browse through it. Also read How to use the Index, which follows the list of contributors and the Explanation of the Topical Index.

Question

Give the name of the article(s) written by Elias E. Manueli dis and his affiliation. Turn to page 21 to be sure you are correct.

_____

_____

You are correct if you answer Nervous System Disorders; Associate Professor of Pathology, Yale University School of Medicine.

Turn to the next page.

Question

A patron wants information about LSD-25. You decide that MHEST might be helpful. What should you do? Pick the correct answer and turn to the appropriate page.

23. Look in the analytical index
24. Look for LSD-25 in its alphabetical place by title in a base volume.
25. Look in the topical index

Your answer is that you would look in the analytical index. You are right. Usually, the spelled-out form rather than an abbreviation is used for an entry; however, in this case, the page reference is given in the index under both LSD-25 and lysergic acid diethylamide. LSD-25 is included in an article on psychotomimetic drugs and does not appear in a base volume under "L."

Turn to page 26.

Your answer is that you would look for LSD-25 in its alphabetical place by title in a base volume. You are wrong. Pick up Volume 7 (where LSD would occur in the alphabet) and look. Then re-read the question on page 22 and pick a better answer.

Your answer is that you would look in the topical index. You are wrong. The information in the topical index is too general for the patron's needs. Return to the question on page 22 and pick the correct answer.

Question

A patron is seeking information on the effect of the pituitary gland on LTH production. In which volume of MHEST can the information be found? On what page. Write in the answers and then turn to page 27 to be sure you are correct.

Volume _____ Page _____

You are correct if you gave the following answer:

Volume 10 Page 250

Turn to the next page.

Question

A patron tells you that as painlessly as possible, he would like to become as informed as possible on all aspects of immunology. He is interested in finding appropriate reading material and feels that a science encyclopedia might be helpful. How would you assist him? Pick the correct answer and turn to the page with the corresponding number.

29. Locate for him the volume containing the part of the alphabet in which "immunology" appears.

30. Suggest he see the topical index

31. Suggest he see the analytical index

Your answer is that you would locate for him the volume containing the section of the alphabet in which immunology appears. This is not incorrect. Following the article on immunology, there would be cross references to tangential subjects. This is not the only approach, however. Return to the question on page 28 and pick another answer.

Your answer is that you would suggest that he see the topical index. Correct. The topical index groups the 7,360 articles in MHEST under about 100 general headings. If the patron studies all the articles listed under the heading Immunology, he can significantly increase his knowledge of the subject.

Turn to page 33.

Your answer is that you would suggest that he see the analytical index. This is not incorrect. The analytical index will point out specific entries on immunology. However, this is not the only approach. Turn to page 30 for an alternative.

Either you goofed or are not following instructions. You were not told to turn to this page. Return to page 28, and continue.

Question

A patron wants information on oceanography. Using MEST, how can he find it? Choose the correct answer and turn to the page indicated by the number preceding it.

34. Alphabetical placement by title

35. Comprehensive (analytical) index

36. Topical index

Your answer is alphabetical placement by title. You are not incorrect. However, this is not the only approach. Pick an answer that is more generally true. The question is on page 33.

Your answer is that you would consult the comprehensive (analytical) index. You are not incorrect. However, this is not the only possible approach. Return to the question on page 33 and pick an answer that is more generally true.

Your answer is that you would consult the topical index. You are not incorrect. However, this is not the only way. Select an answer that is more generally true. Return to the question on page 33.

Your answer is that you could use all the means mentioned to obtain the information. You are correct. This is the preferred answer. Actually, there are five approaches by which information can be found in the encyclopedia:

1. The alphabetical placement by title of articles in the encyclopedia.
2. The comprehensive (analytical) index
3. The topical index
4. The 40,000 cross references among articles
5. The list of contributors in Volume 15 which shows the major articles written by each contributor.

Titles in MHEST are alphabetized by word and not by letter. Place the following list of words in the order in which they appear in the encyclopedia.

Earthmover _____

Earthquake _____

Earth sciences _____

Earth tides _____

Check page 120 in the analytical index to be sure you are correct. Then, continue the instruction by turning to page 39.

A word used as a noun in MHEST precedes the same word used as an adjective. Place the following list in the order in which it would appear in the encyclopedia.

Aircraft _____

Air cooling _____

Air cushion _____

Airfoil _____

Be sure you are correct by checking your answers on pages 9 and 10 of the analytical index. Then, turn to page 40.

Hyphenated terms are alphabetized as single words. Place the following list of words in the order in which it appears in MHEST.

Grassland _____

Grasserie _____

Grass-root beetle _____

Grass crops _____

Check your answers with page 169 in the analytical index to be sure you are correct. Then, turn to the next page.

You have just finished the programmed portion of the instruction.

Now turn to the following page (42) for a brief review exercise.

For the purposes of review, answer the following questions. Answers are to be found on the pages indicated--but you must first locate the correct volume.

1. Are most articles written to be understandable by interested high school students?

2. Where can you find the full name of a contributor who signs only his initials?

3. Are biographical or historical articles included?

4. Are titles of articles alphabetized word by word or letter by letter?

5. Name four fields that the subject ACOUSTICS can be divided into. p. 48-49.

6. A person is interested in all aspects of atmospheric pollution.
   a. Under what headings are various aspects described? p. 643-646.
   b. What is the most recent reference in the bibliography?

7. Why is there a renewed interest in autogiros? p. 674-675.

8. What is an astronomical transit? p. 608-613.
   Name one use of it.

9. When was the airship Hindenburg built? p. 218

10. Name some of the engineering applications of aerial photographs. p. 82-83.

11. What is the full name of a contributor whose initials are G.S.Bo? p. VI.

12. What article did he contribute? p. XXII.

13. What was his affiliation? p. XXII.

Read "How to use the Index" and answer the following questions.

14. How are hyphenated words arranged? p. 1.

15. What does the asterisk (*) mean? p. 1.

16. What is the volume and page reference for material on cabin design for space travel? p. 379-80.

17. Is material on sea water located in one volume or in several volumes? p. 262.

18. What field of knowledge does the subject "Selective medium" belong to? p. 364.

Read the explanatory material which precedes the topical index and answer the following.

19. What is the major difference between the analytical index entries and the topical index entries? p. 459.

20. Which of the five approaches by which one can find information in the encyclopedia would you use first if you wanted to know what subjects the field of control systems engineering covers? p. 459-60.
Why did you choose this particular approach?

21. In the field of oceanography, does the encyclopedia have information on television underwater? p. 489.

Reference for additional information about encyclopedias:

Murphy, Robert W. How to look it up. New York, McGraw-Hill Book Co., 1958. "General encyclopedias." p. 49-59.

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In this unit we will look at two specialized sources of engineering information: One of these is:

Baumeister, Theodore, Ed.
Standard Handbook for Mechanical Engineers. 7th Edition. New York. McGraw-Hill. 1967.

This handbook is an example of a specialized encyclopedia contained in a single volume. It is typical of many handbooks in scientific and engineering fields. Learning how to find information in this work will help you to use other similar books, even though you may be unfamiliar with the subjects and vocabulary you encounter in them.

The Standard Handbook for Mechanical Engineers is like other handbooks in the following ways:

1. It consists largely of short articles on a very broad range of different specialized subjects written by a number of different authors.

2. The range of factual and descriptive information in the articles covers far more than the field of mechanical engineering.

3. The articles will vary from one to another in authority of coverage, factual detail, clarity of presentation, accuracy and the degree to which the article is up to date in that special field.

4. Each article in the handbook attempts to survey or sum up the state of knowledge in the subject covered—in a way that will be understood by readers who are not specialists in that subject.

5. The articles will contain a list of references to the literature of the subjects covered.

Read Figure 1 and Figure 2 carefully. They are facsimiles of the prefaces to the current (7th) edition of the Standard Handbook for Mechanical Engineers -- which we will henceforth call SHME -- and the one which appeared in the original edition. Then turn to page 5.

PREFACE TO THE SEVENTH EDITION

This is the Golden Anniversary edition of the STANDARD HANDBOOK FOR MECHANICAL ENGINEERS. When the book was first published by Professor Marks in 1916 there were doubtless hopes that it would mature to a position of significance in the profession. The intervening fifty years have demonstrated its growth to classic proportions. Its progressive revision has culminated in this Seventh Edition —the work of more than one hundred contributors.

The editor has had the enthusiastic cooperation of his contributors, of his reviewers, and of his publishers to assure the publication of a book that will be useful to the professional engineer and to the student in the rapidly changing scope and practice of mechanical engineering.

For those who find history tantalizing, it is provocative to compare the table of contents of the first edition with that of this Seventh Edition. The additions include such new topics as computers and their adaptation to automatic controls, steam turbines of a million kilowatts capacity, boilers burning coal at the rate of half a dozen tons a minute, nuclear reactors and power plants, supersonic aircraft, astronautics, hovercraft, photoelasticity, air pollution, and water supply. But the many developments in such mundane areas as machine elements, metals, wood, plastics, machine tools, welding, adhesives, and piping, must not be forgotten. Even the treatment of such basic sciences as solid mechanics, thermodynamics and fluid dynamics, and of the increasingly important area of mathematics, has been overhauled to fit the modern demands imposed upon the mechanical engineer.

The profession has felt the impact of expansion of old practices and the introduction of new concepts. The editor has had to reconcile the need to keep the volume size within reasonable bounds with the need to offer the user the kind of comprehensive information that has made the book so useful over the years. In this effort he has had the enthusiastic cooperation of contributors, reviewers, and publishers, and of Theodore Baumeister III and Mrs. Martha W. C. Baumeister in the preparation of the all-important index. No handbook is any better than its index.

Meticulous care has been exercised to avoid errors—ultimately the responsibility of the editor. If any are included through inadvertence, the editor will be grateful for the help of readers in their elimination from subsequent printings of this edition.

THEODORE BAUMEISTER

WILLTOWN BLUFF, S.C.
December 31, 1966

Figure 1

PREFACE TO THE FIRST EDITION*

This Handbook is intended to supply both the practicing engineer and the student with a reference work which is authoritative in character and which covers the field of mechanical engineering in a comprehensive manner. It is no longer possible for a single individual or a small group of individuals to have so intimate an acquaintance with any major division of engineering as is necessary if critical judgment is to be exercised in the statement of current practice and the selection of engineering data. Only by the co-operation of a considerable number of specialists is it possible to obtain the desirable degree of reliability. This Handbook represents the work of fifty specialists.

Each contributor is to be regarded as responsible for the accuracy of his section. The number of contributors required to ensure sufficiently specialized knowledge for all the topics treated is necessarily large. It was found desirable to enlist the services of thirteen specialists for an adequate handling of the "Properties of Engineering Materials." Such topics as "Automobiles," "Aeronautics," "Illumination," "Patent Law," "Cost Accounting," "Industrial Buildings," "Corrosion," "Air Conditioning," "Fire Protection," "Prevention of Accidents," etc., though occupying relatively small spaces in the book, demanded each a separate writer.

A number of the contributions which deal with engineering practice, after examination by the Editor-in-Chief, were submitted by him to one or more specialists for criticism and suggestions. Their co-operation has proved of great value in securing greater accuracy and in ensuring that the subject matter does not embody solely the practice of one individual but is truly representative.

An accuracy of four significant figures has been assumed as the desirable limit; figures in excess of this number have been deleted, except in special cases. In the mathematical tables only four significant figures have been kept.

The Editor-in-Chief desires to express here his appreciation of the spirit of co-operation shown by the Contributors and of their patience in submitting to modifications of their sections. He wishes also to thank the Publishers for giving him complete freedom and hearty assistance in all matters relating to the book from the choice of contributors to the details of typography.

LIONEL S. MARKS

CAMBRIDGE, MASS.
April 23, 1916

* Excerpt.

Figure 2

SHME is intended to supply both the practicing engineer and the student with a reference work that is useful in the rapidly expanding scope and practice of mechanical engineering. How has this been accomplished? Pick the correct answer and turn to the page with the corresponding number.

6. by disregarding volume size in the interest of providing comprehensive information
7. by enlisting the aid of a considerable number of specialists
8. by incorporating the Engineering Index in the Appendix

Your answer is "by disregarding volume size in the interest of providing comprehensive information." You are wrong. In the preface to the 7th edition, the editor says that he has had to reconcile the need to offer the user as comprehensive information as possible. Re-read the information in Figures 1 and 2 then turn to page 5 and select the correct answer.

Your answer is "by enlisting the aid of a considerable number of specialists." Correct. It is stated in Figure 1 that the 7th edition of SHME is the work of more than one hundred contributors. When the handbook was first published in 1916, there were fifty contributing specialists. Turn to page 10.

Your answer is "by incorporating the Engineering Index into the Appendix. You are guessing. Re-read the information in Figure 1 and Figure 2, then turn to page 5 and choose the correct answer.

If you have turned to this page, you are not following instructions.

Return to page 5 and do as directed.

Question

A student using SHME notes that different contributors have written on various aspects of engineering practice and asks if it is reasonable to assume that the points of view expressed might be highly individual ones. How would you respond? Pick the correct answer and turn to the appropriate page.

11. Critical judgment is exercised in the selection of data.
12. Many new topics have been added to fit modern demands imposed on the mechanical engineer.
13. Contributions are reviewed by one or more specialists for criticism and suggestions.

Your answer is: Critical judgment is exercised in the selection of the data. The statement is true in a general way about the information incorporated into SHME; however, it does not answer the patron's question. Re-read the question on page 10, study Figures 1 and 2 if necessary, and choose the correct answer.

Your answer is: Many new topics have been added to fit modern demands imposed on the mechanical engineer. The statement is correct, but you have not answered the patron's question. Study Figures 1 and 2 if necessary re-read the question on page 10, and pick another answer.

Your answer is: Contributions are reviewed by one or more specialists for criticism and suggestions. You are correct. This procedure aids in securing greater accuracy and in ensuring that the subject matter does not embody solely the practice of one individual but is truly representative. Turn to the next page.

Study Figures 3, 4, and 5. They are facsimiles of SHME's Contents. Notice that many topics are included that are not usually thought of in connection with mechanical engineering.

Turn to page 18.

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For the detailed contents of any section consult the title page of that section. The alphabetical index follows Section 18.

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Figure 5

Question

A patron needs to know if SHME has information on a specific aspect of Heat. Using the Contents (Figures 3, 4, and 5), how would you respond? Select the correct answer and turn to the page with the corresponding number.

19. Point out that since Heat does not appear as a section in the Contents, SHME cannot be of help to him.
20. Ask the patron for words synonymous with Heat (if you can't think of any offhand), and turn to the title page of the appropriate section -- if it exists.
21. Use the alphabetical index to locate Heat.

Your answer is that you would point out that since Heat does not appear as a section in the Contents, SHME cannot be of help to him. You are very wrong. By giving this answer you would grossly misinform the patron. Re-read the Contents (Figures 3, 4, and 5), return to the question on page 18, and choose the correct answer.

Your answer is that you would ask the patron for words synonymous with Heat and turn to the title page of the appropriate section. This is not incorrect. It is true that you should obtain all possible information from patrons when attempting to answer a reference question. In this case, mention of any work containing "thermo-" would be sufficient to refer you to Section 4. The title page of Section 4 -- Heat -- lists in detail the contents of the section. However, there is an easier way. Turn to the preferred answer on page 21.

Your answer is that you would use the alphabetical index to find Heat. Correct. The note before the listing of the Contents mentions that this index follows Section 18. Its use would represent the greatest economy of time and effort in this particular case. You will be referred to the title page of Section 4 -- Heat -- where the contents of the section is listed in detail. Turn to page 23.

Either you goofed or are peeking. The instruction did not refer you to this page. Please return to page 18.

Question

A patron using SHME says that he needs to know the meaning of some of the abbreviations in an article he is reading. How would you assist him? Choose the correct answer and turn to the page corresponding to the number beside it.

24. Give him the SHME Vocabulary Supplement
25. Refer him to the Engineers' Thesaurus
26. Suggest that he turn to page xxi in SHME

Your answer is that you would give him the SHME Vocabulary Supplement. You are guessing. There is no such volume. Return to the question on page 23 and select the correct answer.

Your answer is that you would refer him to the Engineers' Thesaurus. Wrong. There is no such book. And, even if there were, its use would not be the correct approach in this particular case. Re-read the question on page 23 and pick another answer.

Your answer is that you would suggest that he turn to page xxi in SHME. You are correct. The Contents notes that the list of Symbols and Abbreviations appearing in SHME begins on page xxi. Turn to the next page.

Question

Study Figure 6. It is a facsimile of the Index to Major Topics in SHME. Notice that there are 18 sections listed in alphabetical order. In which section would articles appear on Heating, Ventilating and Air Conditioning? Select the correct answer and turn to the appropriate page.

29. Section 4

30. Section 14

31. Section 12

INDEX TO MAJOR TOPICS

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Sound, Noise, and Ultrasonics	12
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Strength of Materials	5
Surface Texture (Finish)	13
Surveying	1[illegible]
Thermal Properties of Substances; Thermodynamics	4
Vibration	5
Weights and Measures	1
Welding	13

Figure 6

Your answer is Section 4. You are wrong. This section contains information on Heat Transmission.

Your answer is Section 14. Wrong. Articles in this section concern Compressors, Fans, Blowers.

Your answer is Section 12. Correct. There are articles on Heating, Ventilating and Air Conditioning in this section. Turn to the next page.

Question

Study Figure 7. It is a facsimile of SHME's Important Reference Tables and Charts. Notice that the first number refers to the section and the second number to the page within the section. Indicate where the following data can be found and then turn to page 34 to make sure your answers are correct.

a. Dust Particle Characteristics _____

b. Melting and Boiling Points _____

c. Reciprocals of Numbers _____ _____

d. Specific Heats, Solids, Liquids, Gases _____

e. Temperature Conversion Table _____

f. Viscosities of Fluids _____

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Figure 7

You are correct if you gave the following answers:

a. 7-81

b. 4-5; 4-93

c. 1-24

d. 4-11; 4-22

e. 4-3

f. 3-49; 4-68

Turn to the next page.

Question

A patron asks for names and affiliations of authors writing for SHME on Welding. How could you most readily obtain this information? Study Figure 6, pick the correct answer, and turn to the page where the number beside it appears.

36. Consult the List of Contributors

37. Look in the Index

38. Look in the Index to Major Topics

Your answer is that you would consult the List of Contributors. You are not incorrect. This listing is arrange alphabetically by the last name of the contributor; the affiliation and the stated professional specialization are given. However, you would have to read every name in the list to be sure of finding all authors with this specialty. Turn back to the question on page 35 and select a better answer.

Your answer is that you would look in the Index. You are not entirely incorrect. The names of contributors do not appear in the Index; they are in the List of Contributors. However, the Index will provide information that will be useful to you, Return to the question on page 35 and select another answer.

Your answer is that you would look in the Index to Major Topics. You are correct. You will be referred to Section 13, the section containing information on welding, where authors on welding and their affiliations are listed in the Contents to the section.

Turn to page 41.

Question

Study Figure 9. It is a facsimile of the Contents of Section 13 with information on Welding. Write the name(s) and affiliations of all contributors on the subject. Turn to page 40 to be sure your answer is correct.

You are correct if your answer is that Edward A. Fenton, Technical Director, American Welding Society, is the only contributor in SHME on welding.

Turn to the next page.

Question

How can you determine the aspects of welding covered by Fenton in his article? Choose the correct response and turn to the page where the corresponding number appears. See Figure 8 on the next page.

43. By consulting the Contents to Section 13

44. By consulting the Index

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Figure 8

Your answer us that you would consult the Contents to Section 13. You are not incorrect. A listing of the aspects of welding covered in the article is given. However, this is not the only approach. Turn to page 44 for an alternative.

Your answer is that you would consult the Index. You are correct. The Index gives a detailed break-down of aspects of the subject covered in Fenton's article. However, less-detailed information appears in the Contents to Section 13. Read the information in Figure 9, then turn to page 46.

SECTION 13

SHOP PROCESSES

BY

CARL R. LOPER, JR., Associate Professor, Minerals and Metals Engineering, University of Wisconsin.

E. V. CRANE, Consulting Engineer, Chief Engineer and Research Director (retired), E. W. Bliss Company.

EDWARD A. FENTON, Technical Director, American Welding Society.

SEROPE KALPAKJIAN, Associate Professor, Department of Mechanical and Aerospace Engineering, Illinois Institute of Technology.

JAMES A. BROADSTON, Director, Logistics, Rocketdyne, a Division of North American Aviation, Inc.

RICHARD W. PERKINS, Assistant Professor of Mechanical and Aerospace Engineering, Syracuse University.

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Figure 9

We will now familiarize ourselves with the coverage and arrangement of another handbook that deals with the engineering sciences. It is:

Potter, James H., ed.
Handbook of the Engineering Sciences. 2 vols.
Princeton, N.J., Van Nostrand, 1967.

Read the information in Figure 10. It is a facsimile of the Preface to the Handbook of the Engineering Sciences -- that we will henceforth refer to as HES. In familiarizing yourself with any new reference book, it is always useful to read the preface.

Now turn to page 47.

PREFACE

The range of modern engineering activity and the complexity of the problems to be solved in the scientific world today have inevitably and beneficially affected modern engineering education. Consistently evident during the past 25 years has been the simultaneously analytical and interdisciplinary approach that is necessary to produce engineers capable of confronting the most esoteric and complex of problems. Consequently, current engineering curricula present not only the tested and proved basic disciplines of mechanics, thermodynamics, materials, and applied electricity, but reflect also the broad scope and intricate maturity currently enjoyed by mathematics, chemistry, and physics. From these has arisen that group of courses generally identified as the *Engineering Sciences*.

The HANDBOOK OF THE ENGINEERING SCIENCES recognizes and utilizes the impact of scientific exploration upon engineering development. Volume 1, *The Basic Sciences*, presents seven major sections—mathematics, physics, chemistry, graphics, statistics, theory of experiments, and mechanics—as background for the applied engineering sciences. Volume II, *The Applied Sciences*, has eighteen major sections—thermal phenomena, heat and mass transfer, chemical energy conversion, turbomachinery, nuclear reactor engineering, aeronautics and astronautics, field theory, electromechanical energy conversion, physical electronics, electronic circuits, system dynamics, materials science, machine elements, control systems, operations research, information retrieval, preparation of reports, computers—written to satisfy the engineer's practical needs for thorough explanations, calculations, and examples.

The guiding philosophy in the preparation of this volume has been to assemble, categorize, and digest the more or less enduring fundamental considerations of the principal engineering sciences on a level approximating that of the first-year graduate student in engineering. Both volumes have been prepared by experts in the various fields, and have been reviewed critically to maintain a uniform clarity and applicability. Although useful in itself, material generally designated "hardware"—tables of the sizes and weights of machine parts, standards for the testing of power machinery, and similar data—has been excluded in order to better accommodate the presentation of more basic facts, techniques, and methodology.

In approaching these volumes, the busy reader can be assured that diligent effort has been made to foresee his needs. Superfluous material has been omitted, abridged, and excised in order to keep the work as compact as possible, and each subject has been approached with a recognition of the need for conciseness and precision.

JAMES H. POTTER

January, 1967

Figure 10

Question

A patron wants to purchase a text that will provide a non-technical interdisciplinary approach to the engineering sciences. He asks if you think that HES will best serve his needs. How should you reply? Select the best answer and turn to the page in which the corresponding number appears.

48. Volume I, The Basic Sciences, contains background material for the applied engineering sciences.
49. HES has an interdisciplinary approach that should suit his needs admirably.
50. HES would be unsuitable for his needs.

Your answer is that you would tell the patron that Volume I, The Basic Sciences, contains background material for the applied engineering sciences. The statement is correct but the reply is Wrong. It is irrelevant to the patron's query. Return to the question on page 47 and select a better answer.

Your answer is that HES has an interdisciplinary approach that should suit the patron's needs admirably. You are wrong. Your answer is irrelevant. The patron asked for a text that would provide a non-technical approach to the engineering sciences. Re-read the Preface (Figure 10), return to the question on page 47, and select the correct answer.

Your answer is that HES would be unsuitable for the patron's needs. Correct. The patron is seeking a non-technical text; however, the level of the information in HES approximates first-year graduate study in engineering. He is in need of a text with information that is considerably less advanced. Turn to the next page.

Question

A patron tells you he needs the standard for the testing of power machinery and is sure that HES has these data. How can you best assist him? Refer to Figure 10, select the correct answer and turn to the appropriate page.

53. Tell him that the standards information is probably in Volume 2, The Applied Sciences.
54. Tell him that background information is in Volume I, The Basic Sciences.
55. Tell him that HES cannot help him.

Either you goofed or are not following instructions. You were not told to turn to this page. Return to the question on page 51 and do as directed.

Your answer is that you would tell him the standards information is probably in Volume 2 of HES, The Applied Sciences. Wrong. Re-read the Preface (Figure 10), return to the question on page 51, and pick the correct answer.

Your answer is that you would tell him that background information is in Volume I, The Basic Sciences. The statement is correct, but it is not relevant to the patron's problem. Re-read the Preface (Figure 10), return to the question on page 51, and choose another answer.

Your answer is that you would tell him that HES cannot help him. Correct. The Preface (Figure 10) lists material that has been excluded from HES. Standards for the testing of power machinery do not appear in HES. Turn to the next page.

Question

Figures 11 and 12 are facsimiles of the Contents of Volume I, The Basic Sciences. Where can the postulates and rules of Boolean algebra be found? Give all necessary information. Turn to page 59 to be sure your answer is correct.

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Figure 12

You are correct if you replied that the information in on page 165. You should note that each volume of HES is numbered consecutively from page 1 to the end of the volume. Turn to the next page.

Study Figures 13 through 16. They represent facsimiles of the list of Contributors to Volume 2 and the first pages of the Contents to Volume 2.

Question

A patron says that he is compiling a bibliography on Heat Mass-Transfer and want to list sources cited in HES. What would you suggest he do? Select the best answer and turn to the appropriate page.

65. Note the specializations of the contributors to HES
66. Use information in Figure 15
67. Consult the Index

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Figure 16

You would suggest that he note the specializations of the contributors to HES. Wrong. This could only be of indirect help to him in solving his problem. Re-read the information in Figure 15. Return to the question on page 60 and pick the correct answer.

Your answer is that you would use the information in Figure 15. You are correct. In the contents, each major topic is broken into sub-topics and the material covered under each sub-topic is given. The last item under many of the sub-topics is "Bibliographical References." These lists direct the reader to additional sources of information. Turn to page 68.

Your answer is that you would consult the Index. Wrong. The Index will be of no help to you in this particular situation. Re-read the information in Figure 15, return to the question on page 60, and pick another answer.

Question

A patron asks if HES contains certain information. You do not know which volume will contain it. What should you do? Choose the correct answer and turn to the corresponding page.

70. Consult the indexes in both volumes

71. Suggest a different, more specialized handbook

72. Consult the Contents to both volumes.

You were not instructed to turn to this page. Please return to the question on page 41 and follow directions.

Your answer is that you would consult the indexes in both volumes of HES. Correct. In that way, you can be sure that your search is a complete one. Turn to page 73.

Your answer is that you would suggest a different, more specialized handbook. This is not incorrect. It is possible that a more specialized handbook would serve the patron's needs best. However, the question did not suggest that this is the case. Return to the question on page 68 and select an answer that will apply to HES.

Your answer is that you would consult the Contents to both volumes. This is not incorrect. In the Contents, each major topic is broken into sub-topics. It would be possible to scan the information and make helpful suggestions to the patron. However, this will be time-consuming; there is a better approach. Return to the question on page 68 and select the correct answer.

Now that you have examined two engineering handbooks, will you know which to use in responding to a reference request? To help you become more aware of the similarities and differences between these 2 handbooks, do the following exercises.

(1) You want to know how many calories are equivalent to 1 British thermal unit (BTU).

Using the indexes, see if you can find the answer in the mechanical engineers' handbook (SHME). Then see if the answer is in the Handbook of the Engineering Services.

(2) One of your engineers is looking for some basic information on lasers. Which handbook contains this information?

(3) A user asks for information about valves that are used in pumps. Using the mechanical engineers handbook (SHME):

a. Find 2 ways of using the index to locate the information.

b. Can you find this information by using the finding aids inside the cover of the handbook?

c. Can you find the information by using the table of contents?

Does the Handbook of the Engineering Sciences contain information about pump valves?

(4) Look in both handbooks for information on nuclear reactors. Which handbook appears to have more information? Examine pages 9-158 to 9-182 in the mechanical engineers' handbook and pages 233-275 in volume 2 of the Handbook of the Engineering Sciences. notice that the style of presentation and the information presented are somewhat different in each handbook.